

REMARKS

Claims 1–28 were previously pending in this application. In this response, claims 1, 10, and 19 are amended. No claims are canceled. Claims 1–28 remain pending.

Claim Rejections

Claims 1 – 28 stand rejected under 35 USC §102(e) as being anticipated by U.S. Patent 6,909,700 to Benmohamed et al. (hereinafter “Benmohamed”). The Applicant respectfully traverses the rejection as follows.

In general, Benmohamad is directed to “methods and apparatus for designing packet-based networks, and more particularly, for designing IP (Internet Protocol) networks with performance guarantees” (*see* Benmohamed, col. 1, lines 19–22). Benmohamed does not recite methods and apparatus for dynamically reorganizing nodes in a dynamically reconfigurable network topology; in contrast, Benmohamed discloses a system for designing the physical layout of a static physical network topology. For example, the network topology input to the methods and apparatus of Benmohamed “is provided in the form of a graph $G=(V,E)$ where V is the set of nodes corresponding to the points of presence (POPs where routers are located) and E is the set of links which can be used to provide direct connectivity between the POPs” (*see* Benmohamed, col. 4, lines 25–29).

In contrast, independent **Claims 1, 10, and 19** are generally directed, *inter alia*, to a method, computer program product, and system for an overlay network which may be dynamically reorganized based on a number of factors. An overlay network may be comprised of logical network nodes corresponding to physical network nodes and as

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such may be dynamically reconfigured. The logical nodes are fully functioning network nodes and are connected by fully functioning network links. In contrast, the nodes and links of Benmohamed are portions of information representing a node or a link between nodes and as such are not functional in any way.

Rejections under 35 USC §102(e)

The Office Action rejected Independent Claims 1, 10, and 19, under 35 U.S.C. § 102(e) as being anticipated by Benmohamed, stating "determining a first cost associated with a logical network link between an active node" is disclosed at column 3, lines 39–40 of Benmohamed.

Column 3, lines 39–40 of Benmohamed read as follows:

...unless otherwise noted, the terms "node",
"switch," and "router" as used herein are interchangeable.

The rejection continues "and a first neighboring node of the active node within an overlay network; determining a second cost associated with a proposed logical network link between the first neighboring node and second neighboring node of the active node within the overlay network; and reorganizing the overlay network with a reorganization probability based on the first and second costs and the degrees of the nodes" is disclosed at column 5, lines 12–32 of Benmohamed.

Column 5, lines 12–32 of Benmohamed read as follows:

Referring to FIG. 2, one embodiment of a general design algorithm 200 of the system proceeds as follows. First, the traffic mix F_i at each link is computed (by routing processor 12) based on an initial network topology G_s (from optimization processor 18) which is a subgraph of G , the routing algorithm R , the link metric vector \hat{I} , and the

set of IP demands F (step 202). Second, the capacity of each link required to satisfy the bandwidth demands in F_i is computed (by link capacity requirements processors 14 and 16) based on the type(s) of routers in the network, the different assumptions on congestion scenario, and in some cases the end-to-end delays of the TCP demands (step 204). Third, the design system determines whether the final network design (by optimization processor 18) is obtained (step 206). If not, in step 208, the network topology is perturbed (by optimization processor 18) and the new network cost is evaluated in accordance with steps 202 and 204. This design iteration is then repeated until the final network design is obtained. The results of the final design are output (step 210), e.g., in the form of information displayed to the user of the design system, including: (1) the vector \vec{C} ; (2) the route of each traffic flow f_i ; and (3) the corresponding network cost.

Claim 1 has been amended as follows:

1. A method comprising:
 - determining a first cost associated with a logical network link between an active node and a first neighboring node of the active node within an overlay network;
 - determining a second cost associated with a proposed logical network link between the first neighboring node and a second neighboring node of the active node within the overlay network; and
 - reorganizing the overlay network to replace the logical network link with the proposed logical network link in the overlay network with a reorganization probability based on the first cost and second cost and the size of a neighbor list of the active node, the size of a neighbor list of the first neighboring node, and the size of a neighbor list of the second neighboring node.

The cited section of Benmohamed discloses an initial network topology G_s which is a subgraph of G . Benmohamed discloses G at column 4, lines 24 as "an

initial backbone network topology". Benmohamed further discloses G at column 4, lines 25–29 as "the form of a graph $G=(V,E)$ where V is the set of nodes corresponding to the points of presence (POPs where routers are located) and E is the set of links which can be used to provide direct connectivity between the POPs". A network graph or subgraph is known to those skilled in the art to be a list of information related to nodes and a list of connections or links between the nodes. A network graph or subgraph does not function as a physical network.

In contrast, an overlay network is implemented within a functioning physical network; in particular, an overlay network functions within a functioning physical network. The cited section of Benmohamed lacks the functionality to implement an overlay network as the elements of the graph do not function in any manner. Therefore, the initial network topology G_s as recited in the cited section of Benmohamed is not a physical network, and furthermore can not implement an overlay network as recited in **Claim 1**.

Even if the cited section of Benmohamed were to disclose an overlay network, which it does not, any reorganization would have to be carried out in a physical manner as no method for dynamically reorganizing any type of network at all is disclosed. Any reorganization disclosed in Benmohamed is physically carried out by a designer or another acting person acting in accordance with the designer's instructions.

Therefore, as the cited section of Benmohamed does not disclose an overlay network, it follows that Benmohamed can not disclose an active node, a first neighboring node of the active node, or a logical link between the active node and the first neighboring node of the active node within an overlay network. In addition, because the cited section of Benmohamed does not disclose an overlay network, it follows that the cited section of Benmohamed can

not disclose a second neighboring node of the active node and can not disclose a logical link between a first neighboring node of the active node and a second neighboring node of the active node within an overlay network.

In particular, with respect to an active node, a first neighboring node, and a second neighboring node, the cited section of Benmohamed does not disclose any one or all of these elements. As discussed previously, the cited section of Benmohamed only discloses portions of information representing nodes and links between nodes in the form of a graph (*see* Benmohamed, col. 4, line 4 and lines 25–29). In contrast, the active node, first neighboring node, and second neighboring node of Claim 1 represent computing devices or resources on the overlay network. From the Specification of the Application, page 5, lines 1–15:

FIG. 1 illustrates an exemplary overlay network 100 having self-organizing capabilities. The network 100 includes nodes 102, 104, 106, 108, 112, and 110, which represent computing devices or resources on the network 100. Each node is connected by a physical network link (e.g., physical network link 114). Physical network links may include intermediary networking devices (e.g., intermediary networking device 116), such as routers, proxy servers, etc. Communications between overlay nodes are passed through such physical network links. It should be understood that additional physical network links (not shown) may also be coupled to each node.

More particularly, with respect to a logical network link between an active node and a first neighboring node of the active node within an overlay network, the cited section of Benmohamed does not disclose a physical network, an overlay network, an active node, or a first neighboring node. Furthermore, the cited section of Benmohamed does not disclose a logical network link because the logical network link may only exist within the overlay network. That is, the cited section of Benmohamed does not disclose a functioning physical network

and it follows that the cited section of Benmohamed cannot disclose an overlay network and furthermore cannot disclose a logical network link between any nodes whatsoever.

Therefore, as the cited section of Behmohamed fails to disclose a logical network link, it follows that the cited section of Benmohamed does not disclose determining the cost of a logical network link. In order to determine any type of cost related to a logical network link between an active node and a first neighboring node, the cited section of Benmohamed would be required to disclose a functioning physical network and a functioning overlay network. However, as the cited section of Benmohamed discloses neither, there can be no determination of any type of cost of a logical network link. The same logic applies to a second cost associated with a proposed logical network link between the first neighboring node and a second neighboring node of the active node.

Furthermore, if the rejection is asserting that the cited section of Benmohamed discloses a cost associated with networking properties of a network link, the network cost disclosed in Benmohamed (*see* Benmohamed, col. 5, line 27 and line 33) is a monetary cost. For example, Benmohamed discloses "in one embodiment, an iterative augmentation methodology is provided which attempts to reduce network costs by packing small demands on the spare capacity of some existing links rather than introducing additional poorly utilized links into the network topology" (*see* Benmohamed, col. 2 lines 26–31).

If the rejection is asserting that either computing a traffic mix or computing a bandwidth capacity is equivalent to determining the cost of a logical network link, neither a mix of network traffic nor bandwidth capacities are costs of any type. A mix of network traffic is an enumeration of the types of network traffic at a given point in the network graph (which, as has been established

earlier, is not a functioning network) and the result returned represents the mix, not a cost of any type. Further, computing bandwidth capacities is again an enumeration of the static, or fixed, data transmission capacity of a given point in the network graph and as such, the result of such a computation is the bandwidth capacity, not a cost of any type.

Finally, the cited section of Benmohamed does not disclose reorganizing the overlay network to replace the logical network link with the proposed logical network link with a reorganization probability based on the first and second costs and the degrees of the nodes. As has been discussed, the cited section of Benmohamed discloses a method and apparatus which utilizes a network graph as input. A network graph is not a functioning network and therefore may not implement a functioning overlay network. Therefore, it follows that because the cited section of Benmohamed does not disclose an overlay network of any type, the cited section of Benmohamed may not disclose reorganizing an overlay network using any criteria at all.

Even if the cited section of Benmohamed were to disclose an overlay network, which it does not, the cited section of Benmohamed does not make any disclosure of a network node with a reorganization probability. For example, Benmohamed discloses that the method is performed by the system (see Benmohamed, col. 4, lines 12–13). Therefore, any criteria that may influence the system of Benmohamed to alter the structure of the network graph is included in the system itself and is not included in any of the data associated with a node or link in the network graph.

Furthermore, the cited section of Behmohamed does not disclose reorganizing the overlay network to replace a logical network link with a proposed logical network link with a reorganization probability based on the first

and second costs. Claim 1 has been amended such that the reorganization probability is also based on the size of a neighbor list of the active node, the size of a neighbor list of the first neighboring node, and the size of a neighbor list of the second neighboring node. The cited section of Benmohamed does not disclose an overlay network, and therefore does not disclose an active node, a first neighboring node, or a second neighboring node within an overlay network.

If the rejection is asserting that the network graph disclosed at the cited section of Benmohamed is a neighbor list, nowhere in the section is it disclosed that the size of the graph is used in any way to influence the perturbation of the network graph. Therefore, even if the cited section of Benmohamed were to disclose any type of neighbor list, which it does not, it does not disclose using a neighbor list or any other construct related to the size of the network graph as part of any calculation.

Response To Arguments

The Applicant respectfully traverses the response to arguments as follows. The applicant has amended **Claims 1, 10, and 19**. Also, the response to arguments states, "furthermore Benmohamed et al. discloses the determination and reorganization is based on each link which takes into account the size of a node". As discussed with respect to **Claim 1**, Benmohamed does not disclose a functioning network. In contrast, Benmohamed discloses a system utilizing a network graph, or data representing network points, and a list of links between those points.

Even if Benmohamed were to disclose a functioning network, Benmohamed does not disclose taking into account the size of a node. In

contrast, Benmohamed discloses taking into account a “network mix” (*see* Benmohamed, col. 5, line 19), and a “capacity of each link” (*see* Benmohamed, col. 5, line 18). Neither a network mix nor a link capacity are related to the size of a node. A network mix is not related to the size of a node because a mix typically relates to enumerating the types of elements on the network at a given point. A capacity of each link is not related to the size of a node because a link capacity is affected by network elements other than a node such as copper wire, routers, switches, and the like.

Therefore, the Applicant respectfully disagrees with the substance of the response to arguments for at least the reasons set forth above and requests that the response to arguments be reconsidered and removed.

Claims 10 and 19 were rejected for similar reasons, and Claims 10 and 19 are allowable for at least the reasons set forth above with respect to Claim 1. Each of Claims 2–9 depend from Claim 1 and are patentably distinct over Benmohamed for at least the reasons set forth with respect to Claim 1. Each of Claims 11–18 depend from Claim 10 and each of Claims 20–28 depend from Claim 19 and are patentably distinct over Benmohamed for the reasons set forth above.

Reply under 37 CFR 1.116
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CONCLUSION

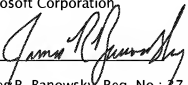
Accordingly, in view of the above amendment and remarks it is submitted that the claims are patentably distinct over the prior art and that all the rejections to the claims have been overcome. Reconsideration and reexamination of the above Application is requested. Based on the foregoing, Applicants respectfully requests that the pending claims be allowed, and that a timely Notice of Allowance be issued in this case. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicant's attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee that is not covered by an enclosed check please charge any deficiency to Deposit Account No. 50-0463.

Respectfully submitted,
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